

5

WHAT IS CLAIMED:

1. A retinal prosthesis test device comprised of:

an external image source producing a video image;

a micro-cable for conducting the video through a patents eye wall;

an electronic chip for demultiplexing the video image into a two-dimensional (2-

D) array of unit cells;

a nanochannel glass electrode array hybridized to said 2-D array of unit cells with
indium bumps and electrically connecting each unit cell to adjacent neural tissue; and

an external electronic circuit board generating a biphasic pulse applied globally to
the unit cells through the micro-cable causing an electronic signal to be applied to a human eye
wherein it is converted to an electrochemical signal transmitted through human tissue within the
eye to a patients optic nerve.

2. A device, as in Claim 1, wherein the nanochannel glass electronic array is comprised of a
hybridized to the microelectronic chip mounted on a ceramic chip carrier, all unit cells controlled
by a series of row shift registers and column shift registers for directing the incoming video
image to a predetermined unit cell.

3. A permanent retinal implant device comprised of:

5 a nanochannel glass electrode array receiving photons through a human iris and
converting said photons to a two-dimensional (2-D) spatially discrete electrical signal residing in
individual unit cells;

an electronic unit located externally on a patient for inductively transmitting electrical
power and control signals to the electronic chip and nanochannel glass electrode array within the
10 patients eye; and

a biphasic pulse generated with on-chip electronic circuitry causing an electrical signal to
be routed through the nanochannel glass electrode array and applied to adjacent retinal tissue in a
human eye where it is converted into an electrochemical signal to be transmitted through retinal
neurons within the eye to a patients optic nerve

15 4. A device, as in Claim 3, wherein the nanochannel glass electronic array is further
comprised of an on-chip antenna for receiving the inductively transmitted signals and applying
them selectively to an array of unit cells, digital electronics for controlling the application of the
electrical to the retinal tissue, an on-chip power receiver for applying power to the array of unit
20 cells, a bias voltage supply for operating the electronic chip, and a biphasic pulse generator for
generating the biphasic pulse, as well as row and column shift registers.